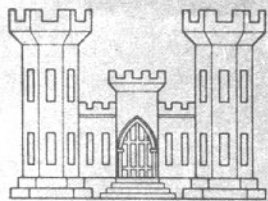


SYNTHESIS OF RESEARCH RESULTS



DREDGED MATERIAL RESEARCH PROGRAM



TECHNICAL REPORT DS-78-8

DISPOSAL ALTERNATIVES FOR CONTAMINATED DREDGED MATERIAL AS A MANAGEMENT TOOL TO MINIMIZE ADVERSE ENVIRONMENTAL EFFECTS

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report is a guidelines manual to assist in selecting disposal alter- natives for contaminated dredged material to minimize adverse environmental ef- fects. It is directed to the small percentage of contaminated sediments that are believed to present a high potential for environmental harm, rather than the great majority of dredging projects that involve uncontaminated or slightly contaminated sediments. (Continued)		

20. ABSTRACT (Continued).

The contaminants and potentially nuisance substances considered in this report include: mercury, cadmium, lead, zinc, copper, nickel, chromium, arsenic, chlorinated hydrocarbons, petroleum hydrocarbons, iron, manganese, nitrogen, phosphorus, and sulfur. Individual contaminants, and in some cases groups of contaminants that behave similarly, are discussed under separate headings. Many of the contaminants respond differently to physical, chemical, and biological conditions at a disposal site.

This report includes a synthesis of research findings of the mobility of contaminants in sediment-water systems, the properties of dredged sediments that affect contaminant release potential, and the short- and long-term physical and chemical environments of dredged material at disposal sites that influence contaminant mobility. Physicochemical (oxidation-reduction, pH, and salinity) conditions of dredged material at a disposal site influence the mobility and bioavailability of most contaminants to a large degree. Typical maintenance dredged sediments are anoxic (reducing) and near neutral in pH. Depending on the disposal methods selected and properties of the dredged sediments, changes in the physicochemical conditions at the disposal site may result in substantial mobilization of certain potentially toxic materials. Understanding the interaction between contaminants, dredged sediment properties, and physical, chemical, and biological conditions at a proposed disposal site permits selection of disposal methods that will minimize contaminant release in many cases. These topics are presented as factors that should be considered in evaluating the environmental risk of a proposed disposal method for a contaminated sediment.

The three major disposal alternatives include subaqueous (open-water), intertidal, and upland methods. A number of variations exist for each of these major alternatives, each having some influence on the fate of contaminants at disposal sites. In many cases, environmentally sound disposal of contaminated dredged material can be achieved by any of the major alternatives if certain variations of each alternative are available and additional management practices discussed in this report are employed.

It was generally concluded that most subaqueous disposal in low-energy aquatic environments where stable mounding will occur will favor containment of potentially toxic materials. A high-energy subaqueous site may result in long-term dispersion and transport of contaminated particulates and possibly greater release to soluble forms.

Effluent from initial dewatering and consolidation at intertidal and upland contaminated dredged material disposal sites may contain contaminants at levels that exceed applicable surface water quality criteria for receiving waters. Practices to maximize suspended particulate removal from these effluents will usually result in a substantial reduction in total contaminant levels. Plant uptake and leaching of contaminants are additional potential long-term problems with these disposal alternatives. However, in many cases, these processes either will not occur to a significant extent or will be manageable problems.

Certain types of dredged material that may become moderately to strongly acid upon drainage and the subsequent oxidation present a high potential for contaminant mobilization under upland conditions. This is potentially one of the greatest problems associated with dredged material disposal. Several potentially toxic metals, cadmium in particular, may be mobilized to biologically available forms or may leach into groundwater under acid, oxidized conditions.

The approach taken in this report is to point out the relative environmental risks of different disposal methods by identifying the possible disposal alternatives and discussing the problems associated with specific contaminants and disposal methods. Certain management practices that may be applicable to some disposal alternatives that will further reduce the environmental risk are also presented.